

*Evidences of the action of two hands in joint signature marks.**By Persifor Frazer.*

From the committee appointed by the Society to investigate the various methods for the examination of documents.

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If it be conceded that the effect of a given individual's will on that individual's mechanism of bones, muscles, nerves, etc., with which it has been associated in all acts of the possessor of both, results in the production of a script characteristic of that individual and of no other; it ought to follow that whatever be the pattern traced, whether a simple cross or a more complex series of conventional signs as in hand-writing, it should contain characteristics of the writer. In the case of a simple cross, these characteristics are much more difficult to discover than in that of ordinary writing or name-signing, but that they exist no one will deny who has taken into consideration the invariable tendency of mankind to contract habits in the performance of all acts which it repeats during a long period, and the growth of a habit in any organized being from constantly taking the easiest method under existing conditions to accomplish what the will has commanded.

The fact that simple marks, made by persons ignorant of the art of writing or deprived of some organ or faculty possessed by the majority of their race, contain characteristics of the individuals who make them, is a logical sequence of the principles of grammapheny,\* and is susceptible of actual demonstration.

It is not the object of this paper to treat of marks of this kind, but of those which are made by one person while another touches the pen-holder.

If great difficulties are encountered in dealing with the first kind of marks the difficulties in those of this second kind are vastly greater and might well be considered insurmountable in so far as the problem is concerned with the establishment of individual character from the traces of *resistance* to free pen movement observable in the joint mark.

The undersigned speaks thus cautiously of the possibility of establishing the characteristics of one person from the traces of his interference with the free work of the actual holder of the pen, a problem comparable to the determination of the orbit and mass and of an unknown planet from the effect of the latter on the movements of a known planet, because it is not possible to state how far legitimate investigation may be extended in the future by new devices and larger knowledge.

\*This word has been used by the writer in his treatise on *Bibliotics; or The Study of Documents* (J. B. Lippincott Co., Philadelphia, 1894), to express the "elucidation of the individual character of hand-writing, or that by which it distinguishes itself from every other hand-writing."

For the present he leaves this problem untouched, admitting that the chances seem against its ever being successfully solved, and addresses himself to the less complex question, "Can a mark made by one person while another is touching the penholder be distinguished from a mark made freely and without external hindrance?"

Without theorizing on the subject, it can best be introduced by the statement of an actual investigation of marks made by a certain man while the penholder was touched by a blind woman.

The simple question was whether or not the marks attached to certain documents were made while the hands of two persons touched the same penholder.

By a cursory examination of the signature marks of some documents (of which the genuineness was disputed) with the signature marks admitted as genuine joint marks, a notable difference was observable. Whereas the former appeared well formed and shaded and gave evidence of having proceeded from a hand skilled in the use of the pen, the latter were ill-formed and ragged, neither symmetrical nor indicating the free movement of an experienced writer. The lines of the admitted signature marks were thin, and especially the cross stroke (which was drawn from the upper left hand to the lower right hand), longer than the similar lines in the disputed signatures. A superficial observation, while plainly indicating differences between the disputed and undisputed signatures failed to establish their respective degrees of importance.

Before further study an examination was made of a list of twenty odd names, among which was what was claimed to be an unauthorized and fraudulent signature-cross. An inspection of both names and cross enabled the undersigned to select the signature which was written by the hand that made the disputed name-cross. The slant of the lines and the spread of the pen nibs corresponded so closely in the two cases that the careful measurements, which were immediately undertaken, were not needed to reveal the connection. This preliminary fact having been substantiated, a meeting between the persons who made the joint marks was arranged in order that their method of proceeding might be witnessed.

As there was a difference of statement between the two as to this method, specimens were taken under the conditions described by each.

The blind woman insisted that she grasped the top of the pen firmly. The guider of the pen maintained that his collaborator merely touched the top of the pen lightly while he wrote.

Joint marks were made by the two persons concerned under observation and were carefully measured. The tabulated results will be found elsewhere (see Table I). Similar measurements were made of other admitted and disputed signature marks and similarly tabulated.

These results also will be found in their appropriate places. The measurements are divided into measures of length and measures of angles, with scrutiny of the manner in which each stroke began and ended.

The bearing of this latter feature upon the question of single or joint production was obvious, because with a foreign hand touching the penholder ever so lightly those movements which depended upon the exercise or release of slight pressure could be produced only in a very imperfect manner.

The tables will be found self-explanatory, but it may be worth while to call attention to a method of utilizing their results which seems to be important in proportion to the diversity and complexity of the factors which enter into them. The extraction of information from tables of statistics is frequently more difficult than the procuring of the statistics themselves. Let any one attempt to master, say the significance as life insurance tables of the necrological reports of the cities and of the country at large, and he will appreciate the value of the art of Mrs. Glass after the hare is caught.

It may be stated as a general fact that the effect of minor components of composite forces are more clearly distinguished when the ratios of parts to each other and to the whole are considered. It is true that this method of presentation is open to the objection that it magnifies very small differences, but on the other hand it clearly distinguishes cases which have resulted from closely similar conditions. The real table of information, therefore, is a table representing the ratio to each other of columns in the original table, and the percentages of difference between measurements of objects whose origin is unknown or in doubt from those of similar objects whose origin is known. It is in this way that the full force of effects produced as in this case by the resistance of a hand touching a moving penholder may be made manifest, as the tables herewith given seem to show. (See the left-hand column of Table I, marked  $\frac{A}{B}$ , or ratio of column A to column B).

When this work had been done, further experiments in joint signature marks by various persons were undertaken, in order that the conditions peculiar to the above case might be replaced by generalizations useful in a wider field of inquiry.

With this view over three thousand five hundred marks were produced and examined, and the table which follows gives the percentages of the occurrence of various features in the free and in the joint marks respectively. Exception percentages such as 2 or 10 in the results indicate different degrees of uniformity in the occurrence or absence of a given characteristic in a mark. Obviously, any feature to which there was not a single exception in the three thousand five hundred experiments, is of importance. The only such feature discovered in these observations was the existence of ragged side terminals in some part, and usually throughout the greater part of a joint mark. When a mark is entirely free from such an appearance, therefore, it may be assumed, with a strong degree of probability, that it was not subjected to the influence of two hands.

In the following summary, as well as in Table I, the letters R. U. mean "right upper" (corner), and L. D. mean "left down" (or left lower cor-

ner), R. U. L. D. means the stroke made from the right upper to the left lower corner, and L. U. R. D. means the stroke from the left upper to the right lower corner. Proceeding from the right upper side in the direction of the sun or of the hands of a watch the four quadrants are designated by R. U., R. D., L. D., and L. U., respectively.

## SUMMARY OF NOTES OF THE ABOVE CASE.

A	B
UNDISPUTED JOINT MARKS.	DISPUTED.
1. R. U. L. D. not convex to R. D.	1. R. U. L. D. convex to R. D.
2. Lines do not broaden in the direction in which drawn.	2. Lines broaden in the direction in which drawn.
3. One, and usually both, of the edges of line are crooked and irregular: one edge continuously so.	3. One edge straight (usually both edges). Crookedness not continuous on either edge.
4. In all genuine cases examined R. U. L. D. was shorter than L. U. R. D.	4. In 66 p. c. of cases examined R. U. L. D. was longer than L. U. R. D.

In three thousand five hundred independent examinations of experimental marks, made either by one individual or by the joint efforts of various couples, there were found to be 10 p. c. of exceptions to A 1; 2 p. c. of exceptions to A 2; but no exceptions to A 3.

A 4 varied so much with the writing habits of different individuals that it is not regarded as of sufficient value to serve as a basis of discrimination.

It should be noticed that the usual absence of strokes convex to R. D. would naturally follow from the situation of the point of resistance when the pen is held in the position which the writing masters used to call "natural," or slanting downward from left to right and pointing over the right shoulder.

In this position to make a stroke R. U. L. D. convex to R. D. would require that the weight, added by the contact of the second hand, should be lifted, because in the act of drawing such a line the penholder must be changed to a more erect position, and the distance between the plane of the paper and that in which the top of the penholder lies would be increased. In drawing the line concave to R. D. this distance would be diminished, and there would be no resistance to overcome.

The illustrations on Plate xix are fairly typical of the respective characters of joint pen marks made while two hands touch the penholder as in the larger cross, and marks made freely by a single hand as in the smaller cross.

Both have been selected from the specimens of hand-writing examined in the case above referred to. It should be borne in mind that the positions of these two crosses relatively to the horizontal guide line are not in-

